Taxonomies of the Cognitive Domain

Bloom's Taxonomy 1956	Anderson and Krathwohl's Taxonomy 2000
1. Knowledge: Remembering or retrieving previously learned material. Examples of verbs that relate to this function are: know define record identify recall name relate memorize recognize list repeat acquire	**1. Remembering: Retrieving, recalling, or recognizing** knowledge from memory. Remembering is when memory is used to produce definitions, facts, or lists, or recite or retrieve material.
2. Comprehension: The ability to grasp or construct meaning from material. Examples of verbs that relate to this function are: restate identify illustrate locate discuss interpret report describe draw recognize discuss represent explain review differentiate express infer conclude	**2. Understanding:** Constructing meaning from different types of functions be they written or graphic messages activities like i**nterpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.**
3. Application: The ability to use learned material, or to implement material in new and concrete situations. Examples of verbs that relate to this function are: apply organize practice relate employ calculate develop restructure show translate interpret exhibit use demonstrate dramatize operate illustrate	**3. Applying:** Carrying out or using a procedure through **executing, or implementing**. Applying related and refers to situations where learned material is used through products like models, presentations, interviews or simulations.

4. Analysis: The ability to break down or distinguish the parts of material into its components so that its organizational structure may be better understood. Examples of verbs that relate to this function are: analyze differentiate experiment compare contrast scrutinize probe investigate discover inquire detect inspect examine survey dissect contrast classify discriminate categorize deduce separate	**4. Analyzing:** Breaking material or concepts into parts, determining how the parts relate or interrelate to one another or to an overall structure or purpose. Mental actions included in this function are **differentiating, organizing, and attributing**, as well as **being able to distinguish between** the components or parts. When one is analyzing he/she can illustrate this mental function by creating spreadsheets, surveys, charts, or diagrams, or graphic representations.
5. Synthesis: The ability to put parts together to form a coherent or unique new whole. Examples of verbs that relate to this function are: compose plan propose produce invent develop design formulate arrange assemble collect construct create set up organize prepare generalize originate predict document derive modify combine write tell relate propose	**5. Evaluating:** Making judgments based on criteria and standards through **checking and critiquing**. Critiques, recommendations, and reports are some of the products that can be created to demonstrate the processes of evaluation. In the newer taxonomy evaluation comes before creating as it is often a necessary part of the precursory behavior before creating something. ■**Remember this one has now changed places with the last one on the other side.**
6. Evaluation: The ability to judge, check, and even critique the value of material for a given purpose. Examples of verbs that relate to this function are: judge argue validate assess decide consider compare choose appraise evaluate rate value conclude select criticize measure estimate infer deduce	**6. Creating:** Putting elements together to form a coherent or functional whole; **reorganizing** elements into a new pattern or structure through **generating, planning, or producing**. Creating requires users to put parts together in a new way or synthesize parts into something new and different a new form or product. This process is the most difficult mental function in the new taxonomy. ■**This one used to be #5 in Bloom's known as synthesis.**

Table 1.1 – Bloom vs. Anderson/Krathwohl

Visual Comparison of the two taxonomies

Bloom et al 1956	Anderson & Krathwohl et al 2000
Evaluation	Evaluate
Synthesis	Create
Analysis	Analyze
Application	Apply
Comprehension	Understand
Knowledge	Remember

One of the things that differentiates the new model from that of the 1956 original is that it lays out components nicely so they can be considered and used. And while the levels of knowledge were indicated in the original work – *factual, conceptual, and procedural* -- these were never fully understood or used by teachers because most of what educators were given in training consisted of a simple chart with the listing of levels and related accompanying verbs. The full breadth of *Handbook I* and its recommendations on types of knowledge were rarely discussed in any instructive way. Nor were teachers in training generally aware of any of the criticisms of the original model. The updated version has added "metacognitive" to the array of knowledge types. Here are the

intersections as the processes impact the levels of knowledge. Using a simple cross impact grid or table like the one below, one can match easily activities and objectives to the types of knowledge and to the cognitive processes as well.

| The Knowledge Dimensions	Cognitive Processes					
	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
Factual						
Conceptual						
Procedural						
Metacognitive						

Knowledge Dimensions Defined:

Factual Knowledge is knowledge that is basic to specific disciplines. This dimension refers to essential facts, terminology, details or elements students must know or be familiar with in order to understand a discipline or solve a problem in it.

Conceptual Knowledge is knowledge of classifications, principles, generalizations, theories, models, or structures pertinent to a particular disciplinary area.

Procedural Knowledge refers to information or knowledge that helps students to do something specific to a discipline, subject, area of study. It also refers to methods of inquiry, very specific or finite skills, algorithms, techniques, and particular methodologies.

Metacognitive Knowledge is the awareness of one's own cognition and particular cognitive processes. It is strategic or reflective knowledge about how to go about solving problems, cognitive tasks, to include contextual and conditional knowledge and knowledge of self.

Source: . Anderson, L. W. and David R. Krathwohl, D. R., et al (2000) *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Allyn & Bacon
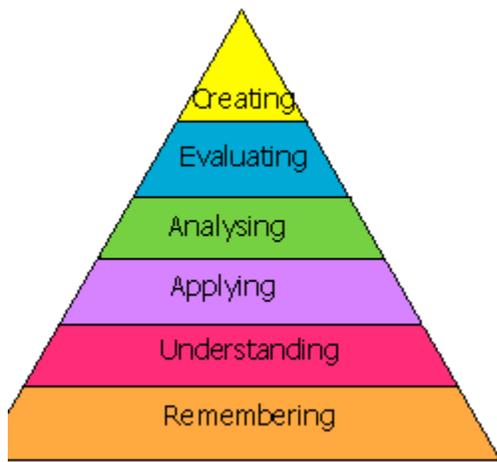
Revised Bloom's Taxonomy of Cognitive Levels

Bloom's Taxonomy defines six different levels of thinking. The levels build in increasing order of difficulty from basic, rote memorization to higher (more difficult and sophisticated) levels of critical thinking skills. For example, a test question that requires simple factual recall shows that you have **knowledge** of the subject. Answering an essay question often requires that you **comprehend** the facts and perhaps **apply** the information to a problem. I wish to promote the **analysis** the subject matter, perhaps by having students break a complex historical process or event into constituent parts. I particularly want students to organize and present pieces of historical evidence it in a new way, to **create or synthesize** an argument. In order to do so, students must **evaluate** evidence, making judgments about the validity and accuracy of primary sources.

Knowing about the different levels of thinking can help you perform better on papers, tests, and other assignments. Often scores will increase if you include something in your answer, paper or project that shows you have **analyzed**, **synthesized**, or **evaluated** the subject matter. Put another way, avoid simple regurgitation. Studying the definitions and verbs below will help you think more creatively about and with greater understanding of the subject. This is a revision of the original taxonomy, updated in accordance with current pedagogy and learning studies. If you're unsure that some of the above boldfaced verbs mean, check this typology of essay verbs.

Critical Thinking Activity [arranged lowest to highest]	Relevant Sample Verbs	Sample Assignments	Sample Sources or Activities
1. Remembering Retrieving, recognizing, and recalling relevant knowledge from long-term memory, eg. find out, learn terms, facts, methods, procedures, concepts	Acquire, Define, Distinguish, Draw, Find, Label, List, Match, Read, Record	1. Define each of these terms: encomienda, conquistador, gaucho 2. What was the *Amistad*?	Written records, films, videos, models, events, media, diagrams, books.
2. Understanding Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining. Understand uses and implications of terms, facts, methods, procedures, concepts	Compare, Demonstrate, Differentiate, Fill in, Find, Group, Outline, Predict, Represent, Trace	1. Compare an invertebrate with a vertebrate. 2. Use a set of symbols and graphics to draw the water cycle.	Trends, consequences, tables, cartoons
3. Applying Carrying out or using a procedure	Convert, Demonstrate,	1. Convert the following into a	Collection of items, diary, photographs,

through executing, or implementing. Make use of, apply practice theory, solve problems, use information in new situations	Differentiate between, Discover, Discuss, Examine, Experiment, Prepare, Produce, Record	real-world problem: velocity = dist./time. 2. Experiment with batteries and bulbs to create circuits.	sculpture, illustration
4. Analyzing Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing. Take concepts apart, break them down, analyze structure, recognize assumptions and poor logic, evaluate relevancy	Classify, Determine, Discriminate, Form generalizations, Put into categories, Illustrate, Select, Survey, Take apart, Transform	1. Illustrate examples of two earthquake types. 2. Dissect a crayfish and examine the body parts.	Graph, survey, diagram, chart, questionnaire, report
5. Evaluating Making judgments based on criteria and standards through checking and critiquing. Set standards, judge using standards, evidence, rubrics, accept or reject on basis of criteria	Argue, Award, Critique, Defend, Interpret, Judge, Measure, Select, Test, Verify	1. Defend or negate the statement: "Nature takes care of itself." 2. Judge the value of requiring students to take earth science.	Letters, group with discussion panel, court trial, survey, self-evaluation, value, allusions
6. Creating Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing. Put things together; bring together various parts; write theme, present speech, plan experiment, put information together in a new & creative way	Synthesize, Arrange, Blend, Create, Deduce, Devise, Organize, Plan, Present, Rearrange, Rewrite	1. Create a demonstration to show various chemical properties. 2. Devise a method to teach others about magnetism.	Article, radio show, video, puppet show, inventions, poetry, short story

Sources: Revised Bloom's Taxonomy site one
Revised Bloom's Taxonomy site two

Homework Assignment   Name: _____

Observe 3-5 teachers for approximately 10 minutes each. Write a brief note to indicate the teaching strategies used and what is the level according to Anderson et. al. Write a reflection based on these observations.

Bloom et al 1956	Anderson & Krathwohl et al 2000
Evaluation	Evaluate
Synthesis	Create
Analysis	Analyze
Application	Apply
Comprehension	Understand
Knowledge	Remember

Reflection: _____
_____
_____
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